Title: METHOD AND APPARATUS TO PROVIDE AN AREA EFFICIENT ANTENNA DIVERSITY RECEIVER

Assignee: Intel Corporation

IN THE CLAIMS

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Please amend the claims as follows:

- 1. (Currently Amended) An antenna diversity receiver comprising:
 - an antenna terminal;
 - a first filter;
 - a second filter;
 - a third filter;
- a selector switch having a first switch position to couple said antenna terminal to an input of said first filter, a second switch position to couple said antenna terminal to an input of said second filter, and a third switch position to couple said antenna terminal to an input of said third filter;
 - a first low noise amplifier (LNA);
 - a second LNA; and
- a[n] <u>first</u> output switch having a first switch position to couple an output of said first filter to an input of said <u>first</u> LNA and a second switch position to couple an output of said second filter to said input of said <u>first</u> LNA; <u>and</u>
- a second output switch having a first switch position to couple an output of said third filter to an input of said second LNA.
- 2. (Currently Amended) The receiver of claim 1, wherein:
- said first filter has a first bandpass frequency range, said second filter has a second bandpass frequency range that is different from said first bandpass frequency range, and said <u>first</u> LNA is operable within both said first and said second bandpass frequency ranges; and
- said third filter has a third bandpass frequency range that is different from said first and second bandpass frequency ranges, and said second LNA is operable within said third bandpass frequency range.
- 3. (Currently Amended) The receiver of claim 1, further comprising:

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an antenna terminal: and

a selector switch having a first switch position to couple said antenna terminal to an input of said first filter and a second switch position to couple said antenna terminal to an input of said second filter

a fourth filter that is different from said first, second, and third filters, wherein said second output switch includes a second switch position to couple an output of said fourth filter to an input of said second LNA.

- 4. (Currently Amended) The receiver of claim [3]1, further comprising: a receive antenna connected to said antenna terminal.
- 5. (Currently Amended) The receiver of claim [3]1, wherein: said selector switch, said first, [and]second, and third filters, and said first and second

output switches are located within a common module and said first and second LNAs [is] are

implemented on a separate semiconductor chip that is coupled to said module.

6. (Currently Amended) The receiver of claim [3]1, wherein:

said selector switch, said first, [and]second, and third filters, said first and second output switches, and said first and second LNAs are implemented on a common semiconductor chip.

7 (Currently Amended) The receiver of claim 3, further comprising wherein:

a third filter that is different from said first and second filters, wherein said selector switch includes a third switch position to couple said antenna terminal to an input of said third filter

said antenna terminal is a first antenna terminal and said selector switch is a first selector switch; and

said receiver further includes:

a second antenna terminal;

fifth, sixth, seventh, and eighth filters;

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a second selector switch having a first switch position to couple said second antenna terminal to an input of said fifth filter, a second switch position to couple said second antenna terminal to an input of said sixth filter, a third switch position to couple said second antenna terminal to an input of said seventh filter, and a fourth switch position to couple said second antenna terminal to an input of said eighth filter;

a third LNA;

a fourth LNA;

a third output switch having a first switch position to couple an output of said fifth filter to an input of said third LNA and a second switch position to couple an output of said sixth filter to said input of said third LNA; and

a fourth output switch having a first switch position to couple an output of said seventh filter to an input of said fourth LNA and a second switch position to couple an output of said eighth filter to an input of said fourth LNA.

8. (Currently Amended) The receiver of claim 7, wherein:

said output switch has a third switch position to couple an output of said third filter to an input of said LNA

said first filter and said fifth filter have a first bandpass frequency range, said second filter and said sixth filter have a second bandpass frequency range, said third filter and said seventh filter have a third bandpass frequency range, and said fourth filter and said eighth filter have a fourth bandpass frequency range, wherein said first, second, third, and fourth bandpass frequency ranges are different from one another.

9. (Currently Amended) The receiver of claim [7]1, whereinfurther comprising:

said LNA is a first LNA and said output switch is a first output switch, said receiver further comprising a second LNA and a second output switch, said second output switch having a first switch position to couple an output of said third filter to an input of said second LNA

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at least one additional filter, wherein said first output switch includes at least one additional position to couple an output of said at least one additional filter to an input of said first LNA.

- 10. (Original) The receiver of claim 1, wherein: said first filter includes a surface acoustic wave (SAW) filter.
- 11. (Original) The receiver of claim 1, wherein: said first filter includes a film bulk acoustic resonator (FBAR) filter.
- 12. (Original) The receiver of claim 1, wherein: said receiver is a dual antenna diversity receiver.
- 13. (Currently Amended) A receiver comprising:
 - a first antenna terminal;
 - a first plurality of filters;
- a first selector switch to controllably couple said first antenna terminal to an input of a selected one of the filters in said first plurality of filters;
 - at least one first low noise amplifier (LNA);
- at least one first output switch to controllably couple an output of said selected one of said filters in said first plurality of filters to an input of a corresponding first LNA;
 - a second antenna terminal;
 - a second plurality of filters;
- a second selector switch to controllably couple said second antenna terminal to an input of a selected one of the filters in said second plurality of filters;
 - at least one second LNA; and
- at least one second output switch to controllably couple an output of said selected one of said filters in said second plurality of filters to an input of a corresponding second LNA;

wherein said first and second antenna terminals, said first and second pluralities of filters, said first and second selector switches, said at least one first output switch, and said at least one second output switch are located within a common module and said at least one first LNA and

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module.

14. (Original) The receiver of claim 13, wherein:

said first plurality of filters and said second plurality of filters include an equal number of

said at least one second LNA are located on a separate semiconductor chip that is coupled to said

filters.

15. (Currently Amended) The receiver of claim 13, wherein:

said first and second antenna terminals, said first and second pluralities of filters, said first and second selector switches, said at least one first output switch, and said at least one second output switch are located within a common module and said at least one first LNA and said at least one second LNA are located on a separate semiconductor chip that is coupled to said module said common module includes a semiconductor chip that carries at least said first and

second selector switches.

16. (Currently Amended) The receiver of claim 1[3]5, wherein:

said first and second antenna terminals, said first and second pluralities of filters, said first and second selector switches, said at least one first output switch, said at least one second output switch, said at least one first LNA, and said at least one second LNA are located on a common semiconductor chipsaid semiconductor chip of said common module includes first and second antenna elements on a surface thereof that are coupled to said first and second selector

switches, respectively.

17. (Original) The receiver of claim 13, further comprising:

at least one other antenna terminal and at least one other selector switch.

- 18. (Currently Amended) A module for use within an antenna diversity receiver system, comprising:
 - a first antenna terminal;
- a first plurality of filters, said first plurality of filters including at least a first filter, and a second filter, a third filter, and a fourth filter;
- a first selector switch to controllably couple said first antenna terminal to an input of a selected one of the filters in said first plurality of filters;
- a[n] <u>first</u> output terminal for connection to a[n] <u>first</u> external low noise amplifier (LNA); [and]
 - a second output terminal for connection to a second external LNA;
- a[n] <u>first</u> output switch having a first switch position to couple an output of said first filter to said <u>first</u> output terminal and a second switch position to couple an output of said second filter to said <u>first</u> output terminal; <u>and</u>
- a second output switch having a first switch position to couple an output of said third filter to said second output terminal and a second switch position to couple an output of said fourth filter to said second output terminal.
- 19. (Currently Amended) The module of claim 18, wherein:

 said first plurality of filters further includes a third filter and a fourth filter; and
 said module further comprises:

a second output terminal for connection to a second external LNA; and
a second output switch having a first switch position to couple an output of said
third filter to said second output terminal and a second switch position to couple an
output of said fourth filter to said second output terminalsaid first plurality of filters
includes at least one additional filter that is coupled to said first output switch.

- 20. (Original) The module of claim 18, further comprising:
 - a second antenna terminal;
 - a second plurality of filters; and

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a second selector switch to controllably couple said second antenna terminal to an input of a selected one of the filters in said second plurality of filters.

- 21. (Original) The module of claim 20, wherein:
 - said module is for use within a dual antenna diversity receiver system.
- 22. (Currently Amended) A system comprising:
 - a first patch antenna;
 - a second patch antenna; and
 - a receiver comprising:
 - a first antenna terminal coupled to said first patch antenna;
 - a first plurality of filters;
 - a first selector switch to controllably couple said first antenna terminal to an input of a selected one of the filters in said first plurality of filters;
 - at least one first low noise amplifier (LNA);
 - at least one first output switch to controllably couple an output of said selected one of said filters in said first plurality of filters to an input of a corresponding first LNA;
 - a second antenna terminal coupled to said second patch antenna;
 - a second plurality of filters;
 - a second selector switch to controllably couple said second antenna terminal to an input of a selected one of the filters in said second plurality of filters;
 - at least one second LNA; and
 - at least one second output switch to controllably couple an output of said selected one of said filters in said second plurality of filters to an input of a corresponding second LNA;

wherein said at least one first LNA includes two or more LNAs and said at least one first output switch includes two or more output switches.

23. (Currently Amended) The system of claim 22, wherein:

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said at least one first LNA includes a single LNA and said at least one first output switch includes a single output switchsaid first and second patch antennas and said first and second selector switches are implemented on a common substrate.

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24. (Currently Amended) The system of claim 22, wherein:

said at least one first LNA includes two LNAs and said at least one first output switch includes two output switches wherein said first and second antenna terminals, said first and second pluralities of filters, said first and second selector switches, said at least one first output switch, and said at least one second output switch are located within a common module and said at least one first LNA and said at least one second LNA are located on a separate semiconductor chip that is coupled to said module.

- 25. (Original) The system of claim 22, wherein: said system is a handheld communicator.
- 26. (Currently Amended) A method for use in an antenna diversity receiver comprising: when operation within a first frequency band is desired:

coupling a first antenna to an input of a first filter associated with said first antenna; and

coupling an output of said first filter <u>associated with said first antenna</u> to an input of a first low noise amplifier (LNA) <u>associated with said first antenna</u>; [and] when operation within a second frequency band is desired:

coupling said first antenna to an input of a second filter associated with said first antenna; and

coupling an output of said second filter <u>associated with said first antenna</u> to said input of said first LNA <u>associated with said first antenna</u>; and when operation within a third <u>frequency band is desired</u>:

coupling said first antenna to an input of a third filter associated with said first antenna; and

coupling an output of said third filter associated with said first antenna to an input of a second LNA associated with said first antenna.

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27. (Currently Amended) The method of claim 26, further comprising:

when operation within said first frequency band is desired:

coupling a second antenna to an input of a third first filter associated with said second antenna; and

coupling an output of said thirdfirst filter associated with said second antenna to an input of a second first LNA associated with said second antenna; and when operation within said second frequency band is desired:

coupling said second antenna to an input of a fourthsecond filter associated with said second antenna; and

coupling an output of said fourthsecond filter to said input of said second first LNA associated with said second antenna.

28. (Currently Amended) The method of claim 26, wherein:

coupling an output of said first filter <u>associated with said first antenna</u> to an input of a first LNA <u>associated with said first antenna</u> includes sending a control signal to a switch.

29. (Currently Amended) The method of claim 2[6]7, further comprising:

when operation within a third frequency band is desired:

coupling said first antenna to an input of a fifth filter; and

coupling an output of said fifth filter to an input of said first LNA

when operation within said third frequency band is desired:

coupling said second antenna to an input of a third filter associated with said second antenna; and

coupling an output of said third filter associated with said second antenna to an input of a second LNA associated with said second antenna.

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30. (Currently Amended) The method of claim 2[6]9, further comprising:

when operation within a third-frequency band is desired:

coupling said first antenna to an input of a fifth filter; and

coupling an output of said fifth filter to an input of a third LNA

when operation within a fourth frequency band is desired:

coupling said first antenna to an input of a fourth filter associated with said first antenna;

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coupling an output of said fourth filter associated with said first antenna to an input of said second LNA associated with said first antenna;

coupling said second antenna to an input of a fourth filter associated with said second antenna; and

coupling an output of said fourth filter associated with said second antenna to an input of said second LNA associated with said second antenna.